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(54) A device for adjusting the mutual inclination between back and seat in an arm-chair, deck-chair or the like.

(57) The invention relates to a device for adjusting and fixing the back (8) and the seat (9) of an arm-chair, deck-chair or the like to a supporting structure (1) allowing said back and seat to continuously reach different positions of reciprocal inclination ranging between two end inclinations respectively corresponding to a minimum and a maximum inclination.

In order to allow the user to vary the inclination between seat (9) and back (8) without removing his bust from the supporting surface and with a very little effort, the back (8) is supported and fixed in a rotary way around a horizontal axis (12) fixed with respect to said supporting structure (1), the seat (9) is fixed to the back (8) by means of hinges (10) and to the structure (1) by means of constraints (6) which support the seat and allow the same to perform predetermined translation and/or rotation movements compatible with the presence of said hinges and without solutions of continuity between said end inclinations, and at least one of said constraints is braked.

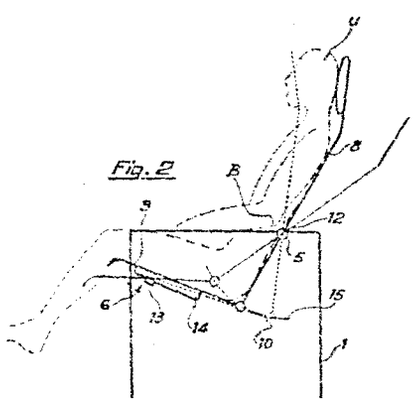

Fig. 2

EP 0 096 273 A2

"A DEVICE FOR ADJUSTING THE MUTUAL INCLINATION BETWEEN BACK AND SEAT IN AN ARM-CHAIR, DECK-CHAIR OR THE LIKE"

The present invention concerns a device for adjusting and fixing the back and the seat of an arm-chair, deck-chair or the like to a supporting structure of same, allowing the seat and back to reach numberless positions of reciprocal inclination between two end inclinations.

A lot of arm-chairs, deck-chairs or similar are known in which the back and the seat can reach different positions of reciprocal inclination thanks to indented adjusting devices provided with a series of notches, each one corresponding to a determined inclination between the seat and back.

Said adjusting devices, however, have the drawback of allowing a limited number of inclinations between the seat the back, moreover considerably spaced.

Another even more serious drawback of the previously mentioned adjusting devices is due to the fact that moving the back from an inclination to another requires a considerable effort from the user, as this latter has to change his own barycenter to vary the back inclination.

In such arm-chairs, deck-chairs or the like, the back, in fact, is hinged in correspondence to the connecting point with the seat and the change in inclination between back and seat is obtained by causing the back to rotate around said hinges, the rotations involving translation along an arc of circumference of the user's barycenter, which is approximately where his loins are.

An object of the present invention is to provide an arm-chair, deck-chair or the like, in which the inclination between back and seat is adjustable, without solutions of continuity, between two end inclinations corresponding to

a minimum and a maximum value respectively, allowing moreover the user to reach said inclinations without changing his barycenter and therefore with a very reduced effort, generally without the need of removing his bust from the chair back.

These objects are achieved by a device for adjusting and fixing the back and the seat of an arm-chair, deck-chair or the like to a supporting structure of same, allowing the seat and back to reach different positions of reciprocal inclination between two end inclinations respectively corresponding to a minimum and maximum inclination, characterized in that said back is supported and fixed in a rotary way around an horizontal axis fixed with respect to the supporting structure; in that said seat is fixed to the back by means of hinges and to the structure by means of constraints which support the seat and allow it to perform predetermined of translation and/or rotation movements compatible with the presence of said hinges and without solutions of continuity between said end inclinations, and in that at least one of said contraints is braked.

More detailedly the change of inclination between the seat and back is obtained by causing the back to rotate around an axis placed approximately where the user's barycenter is, so that his bust rotates around said barycenter, which substantially remains steady. The ends of the back move along arcs of circumference and the seat, which is hinged at the back lower end, performs movements of translation and rotation around an ideal axis. The possibility for the seat of longitudinally translating with respect to the supporting structure is given by a

constraint obtained by coupling in a sliding way a sleeve and a longitudinal guide, while its rotary movement is obtained thanks to a suitable arc-of-circumference configuration of said guide or allowing the sleeve to rotate around a given axis.

Thanks to this device, the back and the seat slide through numberless relative positions, each of them being steady thanks to the correct distribution of weights and to a braking action exercised by the constraints themselves.

The adjusting device according to the present invention will be now better described with reference to a few embodiments of same illustrated, as a mere example, in the annexed drawing, wherein:

- Figure 1 is a perspective view of an arm-chair, in which the inclination between seat and back is adjustable by means of a device according to the invention;
- Figure 2 is a diagrammtic side view of the arm-chair of fig. 1 illustrating the principle of operation of the adjusting device and the extreme positions of the seat and the back as well as of the user's body;
- Figure 3 is a cross-sectional side view of the arm-chair of fig. 1, to the seat of which a feet-rest element is added, and illustrating a first embodiment of the adjusting device;
- Figure 4 is a detailed cross-sectional view showing a part of the adjusting device of fig. 3;
- Figure 5 is a cross-sectional side view of an arm-chair, illustrating a second embodiment of the adjusting device;
- Figure 6 is a detailed cross-sectional view showing a part of the adjusting device of fig. 5.

Referring now to fig. 1, the illustrated arm-chair is of the type consisting of a metal framework and in which the supporting surface is constituted by a piece of cloth or other material kept stretched thanks to the framework itself.

Said arm-chair comprises a supporting structure 1 consisting of two elements 2 having a turned-up-U shape, fixed to one another by shaped crossbars 3 and equipped with reinforcing horizontal bars 4.

A metal tubular framework 7 is fixed to the supporting structure 1 by means of constraints 5 and 6; said framework is formed by an upper section 8 and a lower section 9, respectively forming the back and the seat of the arm-chair, said sections being fixed to one another by means of hinges 10. A shaped cloth 11 constituting the supporting surface of the arm-chair is fixed to the framework 7. The constraints 5 connecting the back 8 to the supporting structure 1 are hinges allowing the back to rotate around a fixed horizontal axis 12 (fig. 2).

The constraints 6 connecting the seat 9 to the supporting structure 1 are small guiding blocks 13, for example hinged to the supporting structure 1 itself, sliding along longitudinal guides 14, for istance fixed to the seat 9.

Said constraints 6 allow the seat 9 to perform movements of translation and rotation, in that, as illustrated in fig. 2, when the back 8 rotates around its own axis 12, its ends move along arcs of circumference 15 and the seat 9, thanks to the contraints consisting of hinges 10, follows said movements performing rotations and translations.

The rotation axis 12 of the back 8 is substantially placed in correspondence to the barycenter B of the user

U and the bust of the latter rotates around the axis 12 and actually around his own barycenter B.

In this way, the user U, by simply winning the work of friction of the contraints 5, 6 and 10, can vary at will and without solution of continuity the reciprocal inclination of back and seat, passing throungh numberless positions of balance, while his own barycenter B remains substantially unchanged. Said positions of balance are kept and secured thanks to the braking action exercised by the friction forces inside the constraints, for instance by the coupling of small blocks 13 and longitudinal guides 14.

Figs. 3 and 4 illustrate a first embodiment of the constraints 6 connecting the seat 9 to the supporting structure 1. Each of said constraints 6 comprises a small block 13 hinged by means of a pivot 18 to the reinforcing bar 4 and a rectilinear and longitudinal guide 14 fixed on the seat 9 side.

The guide 14 has an X section, the upper gap 19 of which houses a tube of the framework 7 and the lower ends 20 of which are coupled to a seat 21 provided in the small block, so that the guide cannot leave the small block. Stop devices, for instance consisting of screws 22 fixing the guides 14 to tube 7, define the end positions of seat 9 with respect to the supporting structure.

Both the small block 13 and guide 14 are suitably made of plastic material.

Figures 5 and 6 illustrate a second embodiment of the constraints 6 connecting the seat 9 to the supporting structure 1, in which the translations and rotations of the seat take place along longitudinal guides 23, having

an arc-of circumference shape, fixed to the seat itself and fixed in a sliding way to the reinforcing bars 4 by means of small blocks 24. Each small block 24 is provided with a horizontal notch 25 in which a flattend section of the guide 23 slides. In this case, too, the guides 23 and/or the small blocks 24 can be made of plastic material.

Figures 3 and 5 illustrate two different constraints 10 connecting the back 8 and seat 9. In figure 5, said constraint is formed by hinges of a conventional type, known in itself, while in fig. 3 it is constituted by sleeves 26 of molded rubber, the ends of which are partly inserted into the tubes constituting the frame of the back 8 and seat 9. Each sleeve 26 houses a small steel cable 27, the ends of which are fixed, for example by rivetting, to the tubes constituting the back and the seat.

Said sleeve 26 allows the back and seat to reciprocally rotate around an axis external to the sleeve itself, in such a way that a rotation axis inside the supporting framework does not form. This prevents the deterioration of the cloth constituting the supporting surface of the chair, in that there is not a single rotation line thereon.

Other sleeves 26 can be used to fix a feet-rest element 28 to the framework forming the seat 9 (fig. 3), said sleeves allowing the user to vary the reciprocal inclination between the seat and the feet-rest element.

CLAIMS

1) A device for adjusting and fixing the back (8) and the seat (9) of an arm-chair, deck-chair or the like to a supporting structure (1), allowing the back and seat to reach different positions of mutual inclination between two end inclinations respectively corresponding to a minimum inclination and a maximum inclination, characterized in that said back (8) is supported and fixed in a rotary way around a horizontal axis (12) fixed with respect to said supporting structure (1), in that said seat (9) is fixed to the back (8) by means of hinges (10) and to the structure (1) by means of constraints (6) which support the seat (9) and allow it to perform predetermined translation and/or rotation movements, compatible with the constraints of said hinges (10, 12) and without solutions of continuity between said two end inclinations, and in that at least one of said constraints (6, 10, 12) is braked.

2) A device according to claim 1, wherein said rotation axis (12) of the back (8) with respect to the framework (1) is placed at a distance from the articulation point between the seat and the back substantially corresponding to the user's barycenter (B).

3) A device according to claim 1 or 2, wherein said seat constraints (6) are such as to allow the seat to perform movements of rotation around a horizontal axis, said axis being able to slide londigudinally with respect to the supporting structure.

4) A device according to claim 3, wherein the constraints (6) between the seat and the supporting structure are supports (24) sliding along longitudinal guides (23) having an arc-of-circumference development, parallel to the seat direction of movement, the supports and guides being respectively fixed to the seat and to the structure, or vice versa.

5) A device according to claim 4, wherein said supports are costituted by two small blocks (24) each having a longitudinal notch (25) each notch being capable of receiving a guide (23) consisting of a flattened bar.

6) A device according to claim 1 or 2, wherein the constraints (6) between the seat and the supporting structure consist of rectilinear guides (14) parallel to the seat direction of translation and fixed in a sliding way to small blocks (13) freely oscillating around horizontal axes, said small blocks and said guides being respectively fixed to the structure and the seat sides, or vice versa.

7) A device according to clamim 6, wherein said guide (14) has a X-shaped section an upper gap (19) of which houses a tube (7) constituting the seat framework, while the guide lower arms (20) are spread apart and are coupled to a seat (21) formed in a small block (17), inserted on a pivot (18), so as to prevent the small block from moving away from said guide (14).

8) A device according to claim 1 or 2, wherein said hinges connecting the seat (9) and the back (8) are in the form of resilient sleeves (26) which can bend around an axis of rotation located outside themselves.

9) A device according to claim 8, wherein said sleeves (26) are formed by elements of molded rubber housing a steel cable (27) said cable being fixed, at each end and by means of rivets, respectively to the seat and the back.

10) A device according to claim 8 or 9, wherein said seat and back comprise metal tubular framewordk connected by such sleeves (26) and sustaining a single piece of cloth (11).

Fig. 1

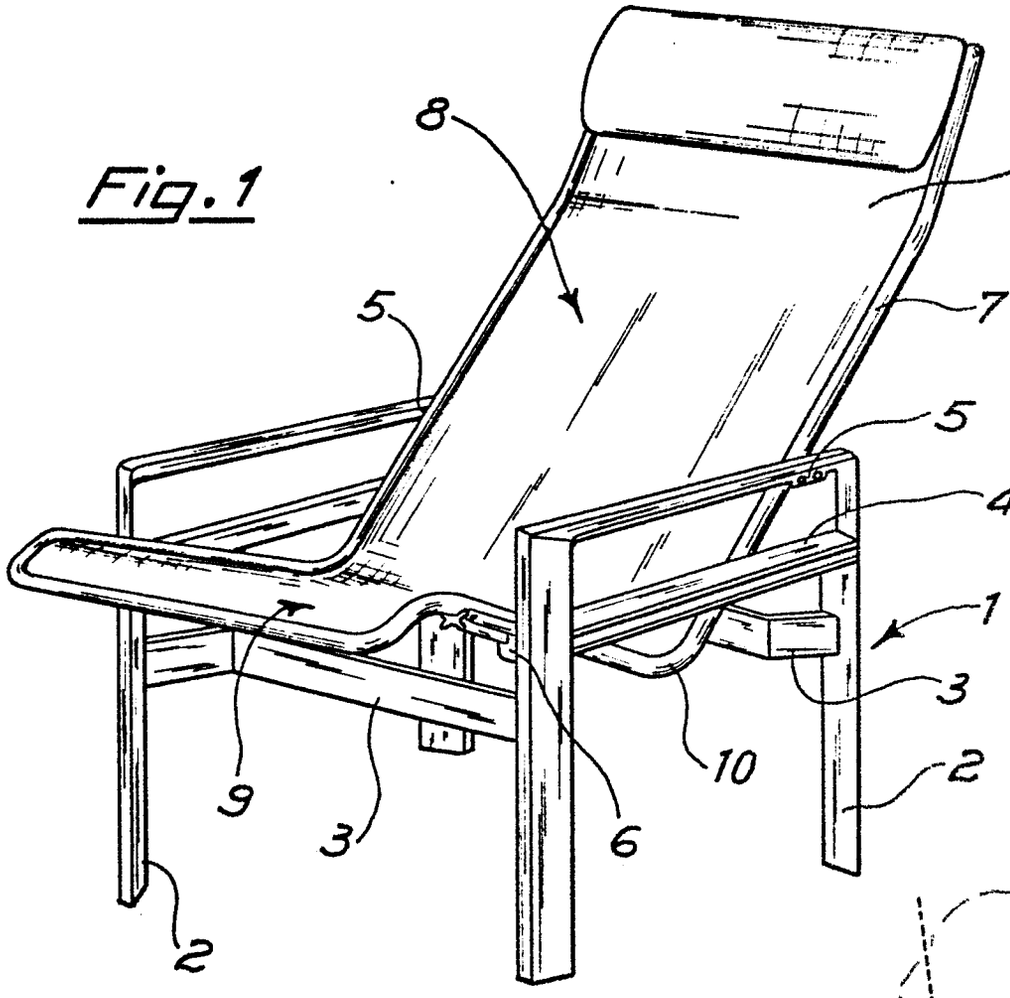

Fig. 2

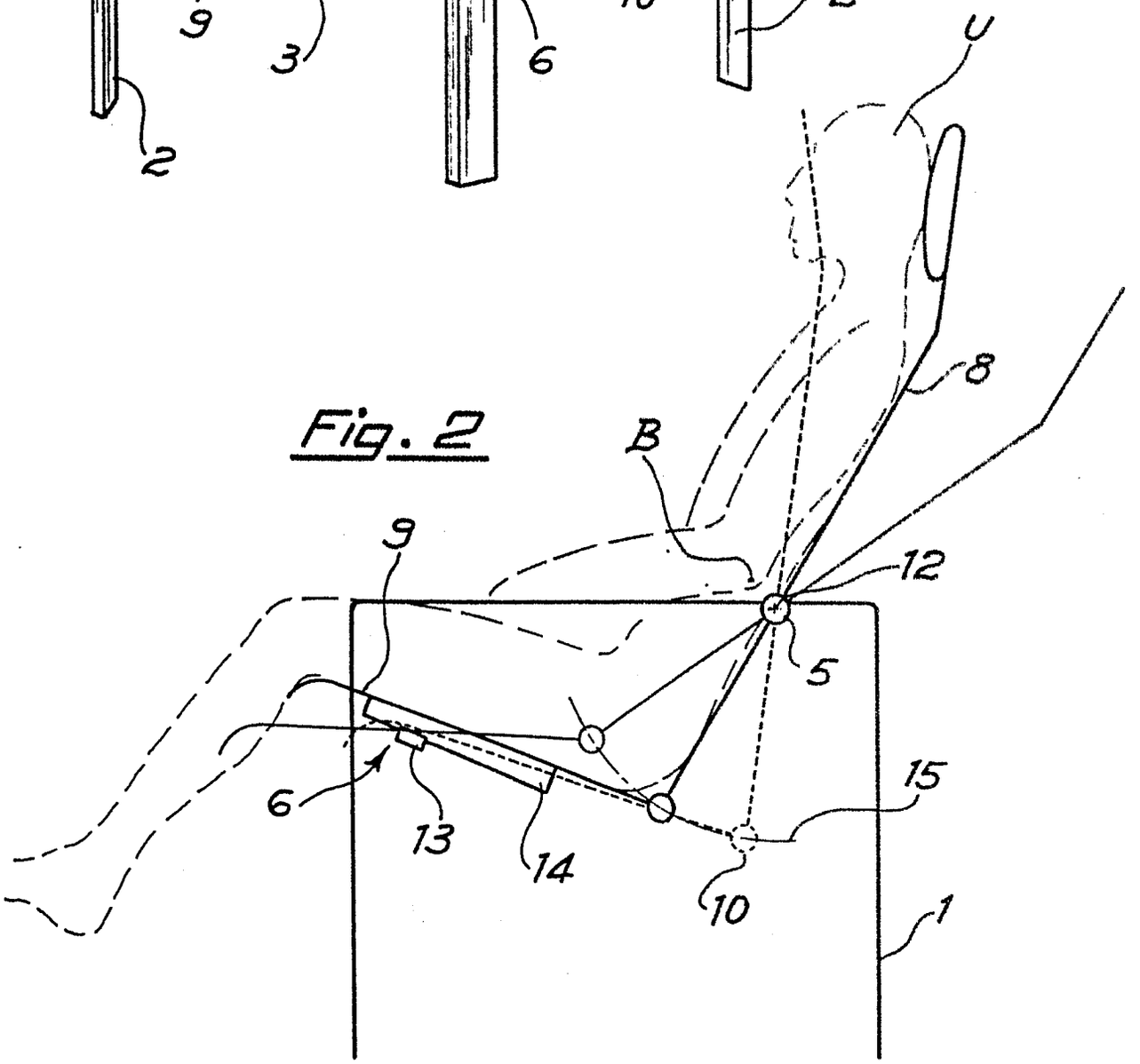

Fig. 3

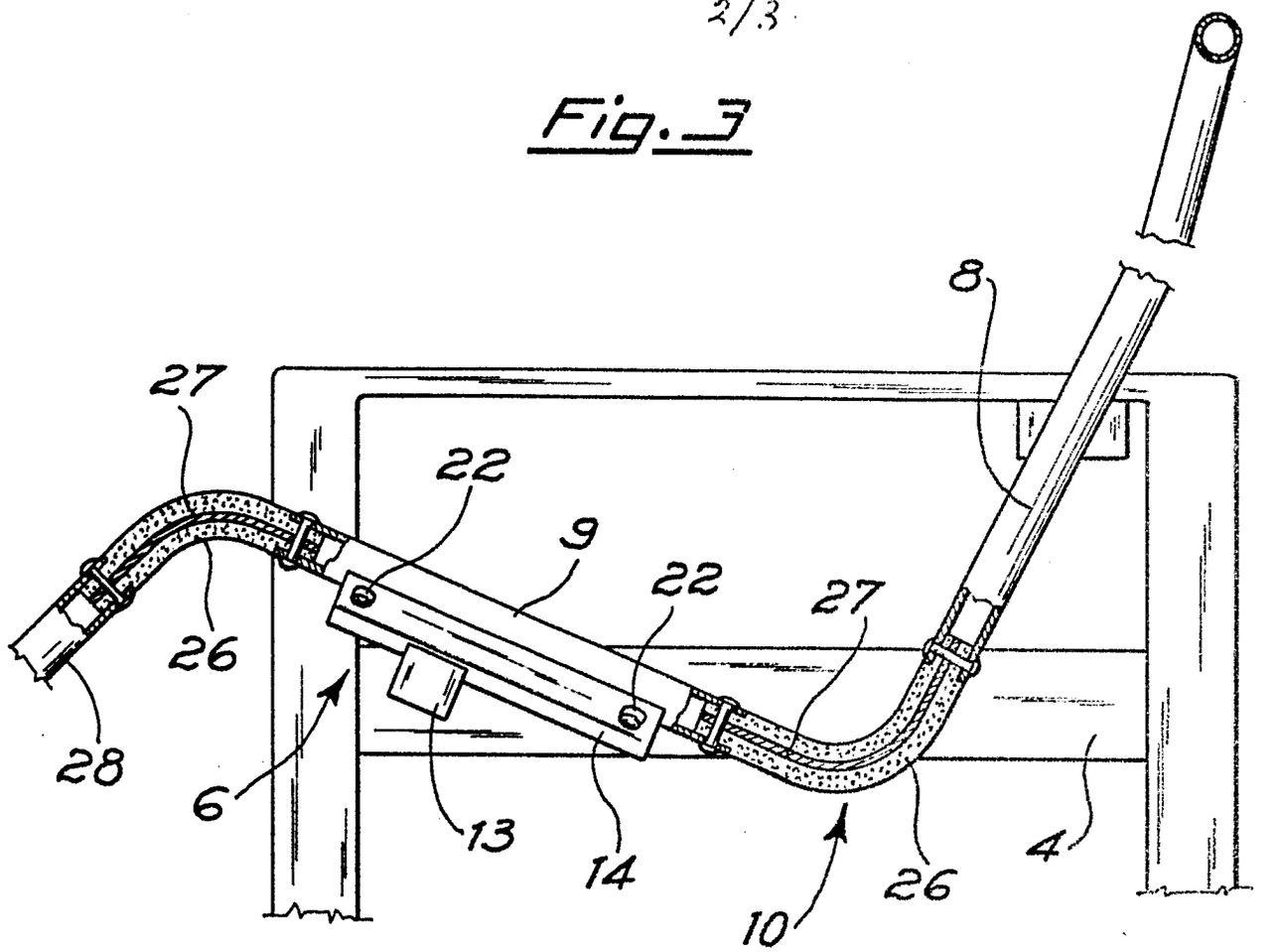

Fig. 4

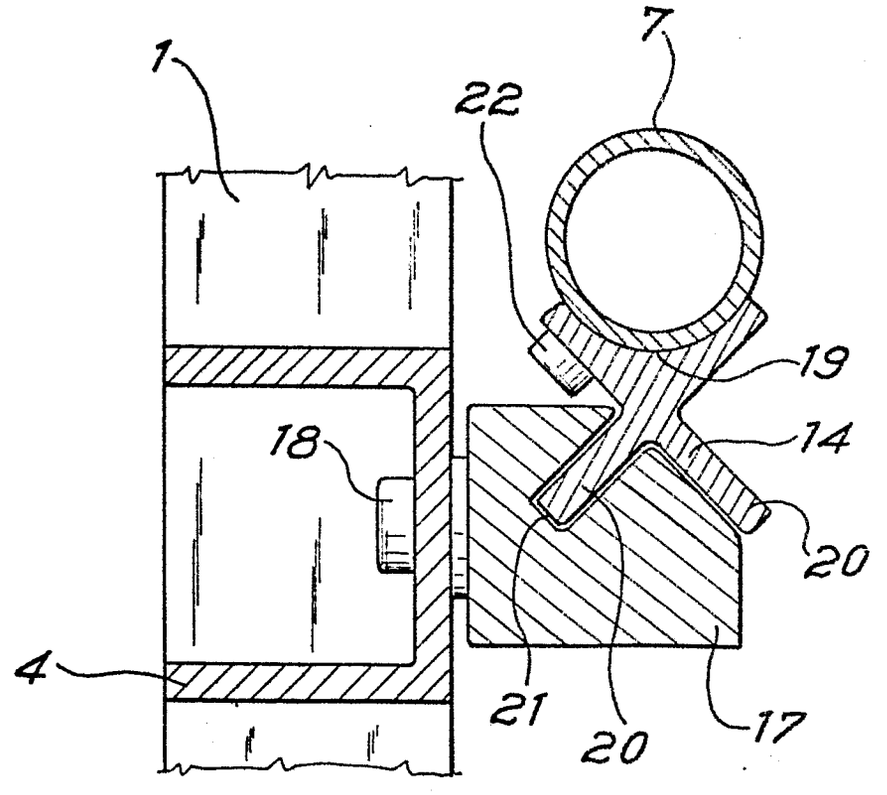

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Fig. 5

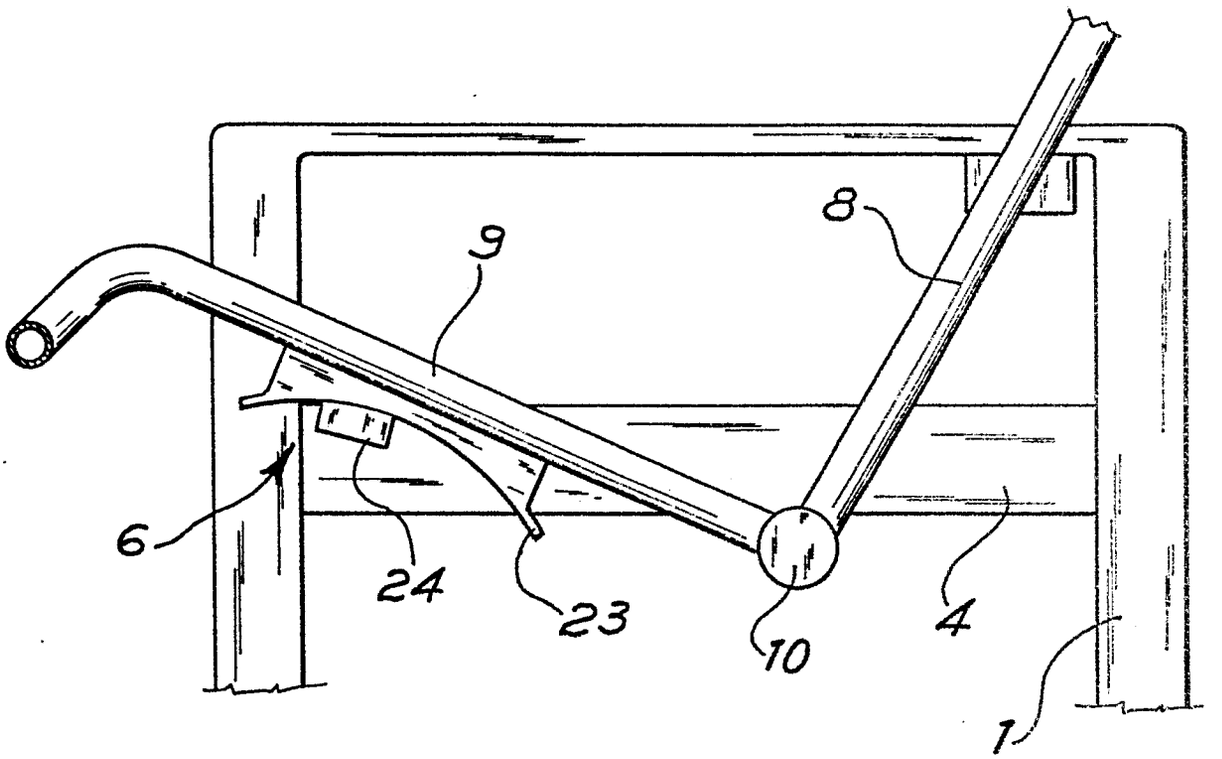

Fig. 6